

PATENT
Atty. Dkt. No. SAR 14209

REMARKS

In the Office Action, the Examiner notes claims 1-12 are pending in the application, claims 9-12 are allowed, claims 1, 3, 4, 6 and 8 are rejected, and claims 2, 5 and 7 are objected to. In view of the following discussion, Applicants submit none of the rejected or objected to claims are obvious under the provisions of 35 U.S.C. § 103. Thus, Applicants believe all pending claims are now in condition for allowance.

I. REJECTION OF CLAIM 1 UNDER 35 U.S.C. § 103

The Examiner rejected claim 1 under 35 U.S.C. §103(a) as being obvious over Garth (U.S. Patent No. 6,259,743, hereinafter "Garth") in view of the Examiner's Official Notice. Applicants respectfully disagree.

Garth discloses a "dual-mode receiver" that "uses a hybrid cost function that provides for automatic constellation phase recovery regardless of whether a CAP signal or a QAM signal has been transmitted." (Emphasis added.) (See Garth Abstract.) Garth further discloses: "The inventive concept will illustratively be described in the context of a receiver that (a) has a dual mode of operation (a CAP mode and a QAM mode), and (b) only uses a single equalizer for both the CAP mode of operation and the QAM mode of operation." (Garth spec., col. 3, lines 29-36.) Garth is concerned only with performing an equalization of the phase component of an output signal, whether that output signal is from a CAP or a QAM transmitted signal.

The Examiner's attention is directed to the fact that Garth is completely devoid of any teaching or suggestion of performing an equalization by generating a cost function using amplitude and phase components of the output signal of an equalizer, as recited in claim 1. Specifically, Applicants' claim 1 positively recites (emphasis added):

1. A method of equalizing a radio frequency (RF) signal comprising:
generating a cost function using amplitude and phase components of the output signal of an equalizer;
minimizing said cost function using a gradient recursion algorithm; and
adjusting the tap weights of said equalizer using the result of said gradient recursion algorithm.

PATENT

Atty. Dkt. No. SAR 14206

Applicants' invention is directed to a method and apparatus for equalizing a radio frequency (RF) signal using a modified constant modulus algorithm (M-CMA). In one embodiment, the M-CMA performs blind equalization by updating the tap weights of an equalizer via a cost function that is derived using both the amplitude and the phase of the output signal. The cost function is minimized using a gradient recursive algorithm and the tap weights are adjusted accordingly. Use of both the amplitude and phase information results in relatively quicker convergence and faster tracking of dynamic distortions in the input channel. The M-CMA operates independently of spacing and modulation scheme of the input signal.

Furthermore, Garth neither teaches nor discloses minimizing a cost function using a gradient recursion algorithm that combines amplitude and phase components into the cost function (i.e., a true two dimensional solution). Garth is completely devoid of any teaching or suggestion of the minimization of a cost function using a gradient recursion algorithm or using amplitude and phase components in the cost function.

In fact, the Examiner admits Garth fails to disclose use of a gradient recursion algorithm for minimizing a cost function but takes Official Notice that "[i]t would have been obvious. . . to modify Garth to incorporate the gradient recursion algorithm, as this algorithm is known in order to provide for automatic phase recovery and minimize the cost function." (Office Action, p. 3, ¶ 2.)

Applicants submit the Examiner has not established a prima facie case of obviousness on at least this assertion because the Examiner has not supported the Official Notice regarding the "gradient recursion algorithm" with any documentary evidence (See MPEP 2144.03(A))(emphasis added):

Official notice unsupported by documentary evidence should only be taken by the examiner where the facts asserted are well-known, or to be common knowledge in the art are capable of instant and unquestionable demonstration as being well-known. . . . For example, assertions of technical facts in the areas of esoteric technology or specific knowledge of the prior art must always be supported by citation to some reference work recognized as standard in the pertinent art. [case citations omitted]

PATENT

Atty. Dkt. No. SAR 14209

The Examiner has not cited to a single reference evidencing "the concept and advantages" of using a "gradient recursion algorithm" in combination with that disclosed in Garth or to support the statement that it is known in the art "to incorporate a gradient recursion algorithm, as this algorithm is known in order to provide for automatic phase recovery and minimize the cost function." "If such a notice is taken, the basis for such reasoning must be set forth explicitly. The examiner must provide specific factual findings predicated on sound technical and scientific reasoning to support his or her conclusion of common knowledge." (MPEP 2144.03(B)(Emphasis added.) Using gradient recursion algorithms as recited in claim 1 of the present invention was not, heretofor, known in the prior art.

Accordingly, Applicants submit that, for at least those reasons stated above, claim 1 as it now stands, fully satisfies the requirements of 35 U.S.C. §103 and is patentable thereunder. Withdrawal of the rejection of claim 1 is respectfully requested.

II. REJECTION OF CLAIM 3 UNDER 35 U.S.C. § 103

The Examiner has rejected claim 3 as being unpatentable over Garth in view of Shen (US Patent No. 5,416,845, hereinafter "Shen"). Applicants respectfully disagree.

Claim 3 depends from independent claim 1 and recites additional features therefor. Because, as discuss above, the Garth reference does not teach, suggests or otherwise render obvious Applicants' invention as recited in claim 1, dependent claim 3 is also not rendered obvious and are allowable. Accordingly, withdrawal of the rejection of dependent claim 3 is respectfully requested.

III. REJECTION OF CLAIMS 4 AND 6 UNDER 35 U.S.C. § 103

The Examiner has rejected claims 4 and 6 as being obvious over Gevargiz et al. (US Patent No. 6,301,313, hereinafter "Gevargiz"), in view of Garth. Applicants respectfully disagree.

The Examiner admits Gevargiz does not disclose an equalizer having a plurality of tap weights or a modified constant modulus algorithm (M-CMA) circuit for adjusting

Page 7

PATENT

Atty. Dkt. No. SAR 14209

said plurality of tap weights. The Examiner attempts to bridge the gap by citing Garth for these teachings. The Examiner's attention is directed to the fact that Garth is completely devoid of any teaching or suggestion of a M-CMA circuit for adjusting the tap weights as recited in claim 4. Specifically, Applicants' claim 4 positively recites (emphasis added):

4. A apparatus for receiving a radio frequency (RF) signal comprising:
at least one antenna for receiving the RF signal;
at least one tuner for selecting the RF signal from a desired frequency band;
an equalizer having a plurality of tap weights; and
a modified constant modulus algorithm (M-CMA) circuit for adjusting said plurality of tap weights.

Thus, combining Gevargiz with Garth simply fails to make Applicants' invention obvious as claimed in claim 4.

Claim 6 depends from independent claim 4 and recites additional features therefor. Because, as discuss above, the Gevargiz reference does not teach, suggests or otherwise render obvious Applicants' invention as recited in claim 4, dependent claim 6 is also not rendered obvious and is allowable. Accordingly, withdrawal of the rejection of claims 4 and 6 is respectfully requested.

IV. REJECTION OF CLAIM 8 UNDER 35 U.S.C. § 103

The Examiner has rejected claim 8 as being obvious over Gevargiz in view of Garth as applied to claim 6, in further view of Shen. Applicants respectfully disagree.

Claim 8 depends from independent claim 4 and recites additional features therefor. Because, as discuss above, the Gevargiz reference combined with Garth, does not teach, suggests or otherwise render obvious Applicants' invention as recited in claim 4, dependent claim 8 is also not rendered obvious and is allowable. Accordingly, withdrawal of the rejection of claim 8 is respectfully requested.

PATENT

Atty. Dkt. No. SAR 14209

V. ALLOWABLE SUBJECT MATTER

The Examiner has objected to claims 2, 5 and 7 as being dependent upon rejected base claims 1 and 4, respectively. Applicants thank the Examiner for indicating the conditional allowability of such subject matter, but have hereinabove provided arguments refuting the rejections of the independent claims. Thus, no changes to the dependent claims are made at this time. Withdrawal of this objection is respectfully requested.

Applicants also acknowledge, and thank the Examiner for, allowance of claims 9-12.

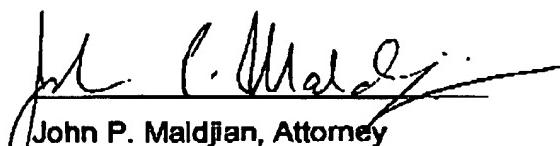
CONCLUSION

Thus, Applicants submit all of these claims now fully satisfy the requirements of 35 U.S.C. §103. Consequently, Applicants believe all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes there are any unresolved issues requiring the issuance of a final action in any of the claims now pending in the application, it is requested the Examiner telephone Mr. John P. Maldjian, Esq. at (732) 935-7100 so appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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Date


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